Chapter Three: Habitat, Fish and Wildlife

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A. Habitat

1. Forest systems

Terrestrial vegetation in the Susitna basin is composed of several overlapping vegetation systems. Biomes provide important habitat for fish, wildlife, and human survival. The generalized forest and tundra habitats are not exact and local conditions may vary. Species composition of forest types is described in bold below.

Forests of the study area consist primarily of lowland and upland spruce-hardwoods with patches of low brush bog and muskeg associated with lowland and lake areas. Bottomland spruce-hardwoods are found along all major rivers. An upland spruce hardwood forest skirts the perimeter of the Susitna basin below its tree line (AEIDC, 1974). Major forest groups of the Susitna basin are described below. Local species composition may vary.

Upland spruce hardwood forests are dense compositions of black cottonwood, white spruce, Alaska paper birch, quaking aspen, and balsam poplar trees. Shrubs living beneath the protective canopy include willow, alder, rose, high bush cranberry, lingonberry, raspberry, and currant. Plants inhabiting the floor include fireweed, horsetail, and several species of ferns, lichens, mosses, mushrooms, and fungi. Lower level organisms, like insects and fungi, are important for nutrient exchange and ultimate existence of creatures higher up the food chain. Young trees and shrubs in this forest provide food for moose, protective habitat for furbearers, and soil stabilizing root systems for erosion control (AEIDC, 1974: 127).

Lowland spruce-hardwood forests are composed of mixed groupings of white spruce, paper birch, quaking aspen and balsam poplar with pure stands of black spruce, and open areas of shrubs, mosses and lichens. Some shrubs include willow, dwarf arctic birch, lingonberry, blueberry, Labrador tea, crowberry, and bearberry. This forest system provides important browse for moose (AEIDC, 1974:126).

Bottomland spruce-poplar forests consist of white spruce mixed with balsam poplar and tall cottonwoods. Birch, aspen, and black spruce also populate river terraces and flood plains. Young trees compete with aggressive shrubs including American green alder, thinleaf alder, willow, rose, blueberry, raspberry, high bush cranberry, bearberry, Labrador tea, and many others. Grasses and plants characteristic of upland and lowland forests also dominate the forest floor. The tall trees of this system provide important feeding habitat for riparian animals including hawks, eagles, wolverines, and black bears (AEIDC, 1974:126).

Low brush bog and muskeg forests are dominated by dwarf shrubs and a thick mat of sedges, mosses and lichens. Black spruce, western hemlock, and Alaska cedar are found in drier portions. Shrubs include Labrador tea, bog cranberry, willow, crowberry, blueberry, resin birch, and dwarf arctic birch. Plants include cottongrass, sedges, rushes, forbs, lichens, mosses, liverworts, mushrooms and other fungi. This system is especially important for many species of migrating and nesting waterfowl, and finfishes like salmon and trout (AEIDC, 1974: 130).

Finally, alpine meadow and tundra scrub is composed mainly of low mat plants found on rock and rubble above 2,500 feet. Vegetation includes dwarf arctic birch, arctic willow, arctic sandwort, sedges, lichens, and mosses (AEIDC, 1974: 131).

2. Wetlands and Aquatic plants

The lakes, ponds, pools, ditches, and sluggish streams of Southcentral Alaska support a greatly varied flora. These aquatic plants range from unicellular green and blue-green algae, and more visible filamentous green algae to sedges, rushes, grasses, and other higher plants, many of which flower in their watery habitat. Aquatic mosses, present in many locations, and many other tender underwater herbs are favored foods of moose (AEIDC, 1974:132).

Wetlands are lands where saturation is the primary factor in determining how soil develops and the types of plants and animals living in the soil and on the surface. Wetlands must have one or more of the following attributes: 1) at least periodically, the land supports predominantly hydrophytes (water-loving plants); 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin, et al., 1979). Wetland habitats are considered especially sensitive to the impacts of terrestrial creatures including beavers and man. They are also especially important to waterfowl and fishes including salmon, billed birds, loons, and ducks.

B. Fish and Wildlife Populations

1. Fish

Fish population status varies among species and fluctuates depending on ecological factors such as food and predator abundance, reproductive success and survival, and ocean circulation phenomena. Historic abundance has varied widely over the last several decades. Anadromous fish returns are estimated by ADF&G annually. The harvest of all species described is regulated by ADF&G. The use of fish and their value are described in Chapter Four.

There are many anadromous and resident fishbearing rivers and creeks in the study area (see Table 3x). In the Susitna River, pink, chum, coho, king and sockeye are present. This is also a known chum salmon spawning area, and a king and sockeye rearing area. In the Kroto Slough area, coho, sockeye and king rear their young and coho spawning has been documented. In Fish Creek, king and coho spawning occurs with known king rearing in this tributary. In Alexander Creek, spawning and rearing activity is present for coho, pink, sockeye and king (Rappoport, 2000).

a. Salmonids and Trout

Pacific salmon (*Oncorhynchus sp.)*, rainbow trout *(O. mykiss)*, arctic grayling *(Thymallus arcticus),* as well as Dolly Varden *(Salvelinus malma)* spend portions of their life cycle in the study area. Most salmon spawn in freshwater streams between June and September. Eggs and juveniles are present in freshwater year-round, and smolt migrate to the ocean from mid-April through mid-July. (Trasky, 1995:4, citing to Bucher and Hammerstrom, 1993). Pacific salmon spend up to seven years in the open ocean before migrating back to freshwater in Alaska to spawn and die.

Pink salmon *(O. gorbuscha*) are the smallest of the five species of Pacific salmon. They are distributed throughout study area from spring through early fall and exhibit cyclical population variance with larger numbers occurring during even numbered years. Spawning pink salmon reach Cook Inlet in early July, where they spawn in most streams of this region. Pink salmon may also spawn in some estuarine streams. Females deposit between 1,500 to 2,000 eggs in the gravel of spawning streams. After about six months, the eggs hatch into yolk-feeding alevins (Mickelson, 1989). The alevins remain in the gravel for several weeks and emerge in April and May. The fry migrate downstream, form large schools in estuarine areas and remain

there for several months before migrating out to sea. They remain at sea for two years where they feed mainly on crustaceans, squid, and small fish (McPhail and Lindsey, 1970).

Table 3.1: Documented Anadromous[1] and Freshwater Streams and Lakes in the Study Area

River/Creek/Lake	*Species Present[2]*
Alexander Creek	CO, K, S, P, CH, DV, RT, GR, NP
Alexander Lake	CO, K, P, CH, DV, RT, GR, NP
Cache Creek	CO, K, P
Canyon Creek	CO, K, P, CH
Clearwater Creek	CO, K, P
Deshka River	CO, K, S, P, DV, RT, GR, W
Donkey Creek	CO, K, S, P
Fish Creek (Flathorn Lake)	CO, K, S
Fish Creek Kroto Slough	CO, K, S
Hewitt Creek	CO, S
Hewitt Lake	S
Indian Creek	CO
Johnson Creek	CO, K
Kahiltna River	CO, K, P, CH
Kashwitna River	CO, K, S, P, CH, DV, RT, GR
Kichatna Creek	CO, K
Kroto Slough	CO, K, S
Lake Creek	CO, K, S, P, CH, DV, RT, LT, GR, NP
Little Willow Creek	CO, K, S, P, CH, DV, RT, GR, WF
Long Lake	CO, RT, NP
Moose Creek (Kroto)	CO, K, S, P, CH,
Moose Creek (Yenta)	CO
Nakochna River	CO, K
Peters Creek	CO, K, P, CH, RT, GR
Red Creek	CO, K
Red Shirt Lake	CO, S, NP
Shell Creek	CO, S, P
Skwentna River	CO, K, S, P, CH
Sucker Creek	CO, K, S, P
Susitna River	CO, K, S, P, CH, DV, RT, GR, , NP, WF, EU
Talachulitna River	CO, K, S, P, CH, DV, RT, GR, WF
Trapper Creek	CO, K
Trapper Lake	CO, K, RT, NP
Wolverine Creek	CO, K
Willow Creek	CO, K, S, P, CH, DV, RT, GR, WF
Yentna River	CO, K, S, P, CH , RT, GR, NP, WF
Source: Fink 2001	

[1]For a complete listing of documented anadromous water bodies, consult the current edition of the Alaska Department of Fish and Game's Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes.

[2]CO=coho salmon; K=king salmon; S=sockeye salmon; P=pink salmon; CH=chum salmon; RT=rainbow trout; DV=Dolly Varden/arctic char; LT=lake trout; GR=grayling, WF=whitefish; NP=northern pike; EU=Eulachon

Chinook (king) salmon *(O. tshawytscha)* are the largest of the Pacific salmon species at maturity. Chinook salmon rear in freshwater for two winters before their seaward migration, and they may spend three to four years in the ocean. In most areas, spawning takes place in late June through late July. A large female may contain up to 8,000 eggs. The eggs hatch in about 7 to 9 weeks depending on the water temperature. The young emerge from the gravel 2 to 3 weeks after hatching (McPhail and Lindsey, 1970). They rear in freshwater for two winters before their seaward migration; they may spend 3 to 4 years in the ocean. Spawning chinook salmon enter Cook Inlet during early May and are present in some spawning streams by the end of that month (MMS, 1995: III.B.7).

Chum (dog) salmon *(O. keta)* are reared throughout the Cook Inlet/Susitna region. They enter Cook Inlet beginning in early July, and runs continue through early August. Chum salmon spawn in many streams throughout the region. Average females carry 2,000 to 4,300 eggs that hatch in early spring. Chum salmon migrate to sea in the same spring or early summer in which they emerge from the gravel. They return to spawn after two to four years at sea (Rogers, 1987). Chum salmon are an important source of nutrition for wildlife and domestic animals (sled dogs), especially in interior Alaska.

Coho (silver) salmon *(O. kisutch)* are the last of the Pacific salmon to return to the study area each year to spawn. They enter Cook Inlet in late July, and the runs continue until late September. Females deposit between 2,500 to 5,000 eggs in stream gravel, and emergent fry remain in the stream for two winters before migrating to the ocean. In Cook Inlet, this migration usually occurs annually from March through June. Coho remain in the North Pacific Ocean for two to three winters before returning to spawn in their natal stream (MMS, 1995: III.B.6).

Sockeye (red) salmon *(O. nerka)* is the most valuable commercial-salmon species in the Cook Inlet region, with extensive runs to streams and lakes. These fish migrate in large schools over much of the North Pacific Ocean and into the eastern Bering Sea. Adult sockeye spawners return to the Cook Inlet region in late June, and the runs continue through early August. Juvenile sockeye spend one to two winters in upstream lakes before their seaward migration. They remain at sea for 2-4 years before returning as mature adults (McPhail and Lindsey, 1970).

Arctic grayling *(Thymallus arcticus)* are found in nearly all tributaries of the Susitna River, especially the clearwater tributary systems. It is an elegantly formed cousin of the trout with its sail-like dorsal fin dotted with large iridescent red or purple spots. Grayling usually spawn in the study area from late May to mid June. Grayling fry hatch about three weeks after spawning, and they tend to occupy the quieter waters near where they were spawned. In the early fall, grayling begin a leisurely downstream migration to reach overwintering areas (ADF&G, 1994).

Dolly Varden and rainbow trout are found in rivers throughout the Susitna region. Dolly Varden spawn from August through November; rainbow trout generally spawn from mid-April through June. The number of eggs for Dolly Varden generally ranges from 600 to 8,000 per female. While female rainbow trout average 3,250 eggs (ADF&G, 1985b:173).

Other fresh water fishes in rivers and streams throughout the study area include whitefish *(Coregonus spp. and Prosopium spp.)*, northern pike *(Esox lucius),* eulachon *(Thakeichtys pacificus)* and burbot *(Lota lota)*.

2. Birds

The study area provides important habitat to many species of birds. Tule white-fronted goose *(A a. gambelli)* nesting and molting habitat that has been identified along the Kahiltna and Yentna rivers. Tule geese arrive in the upper Cook Inlet in April. They start to leave for wintering grounds in California by mid-August, prior to the hunting season. There have been no recent counts of Tule geese in Alaska; however,

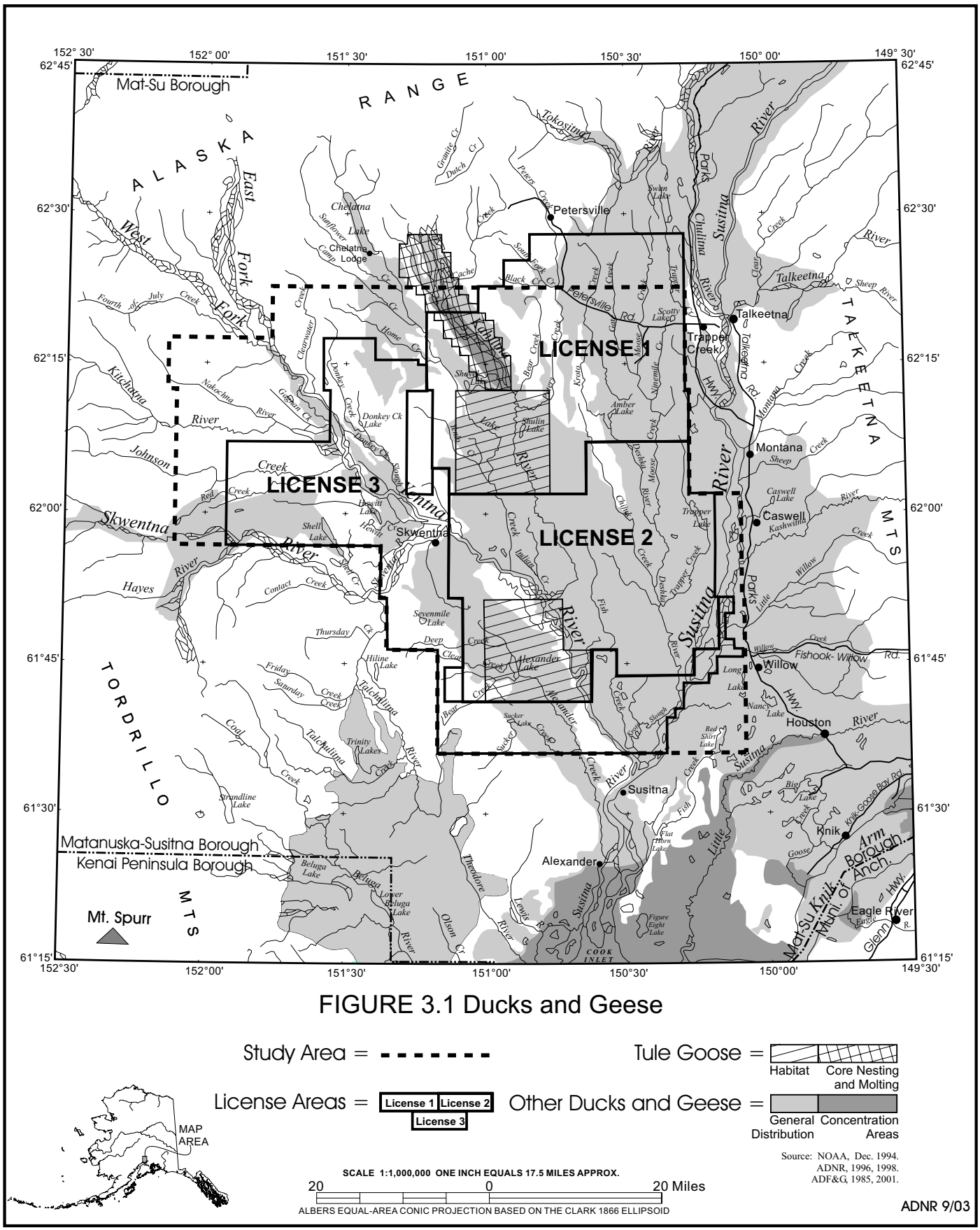

FIGURE 3.1 Ducks and Geese

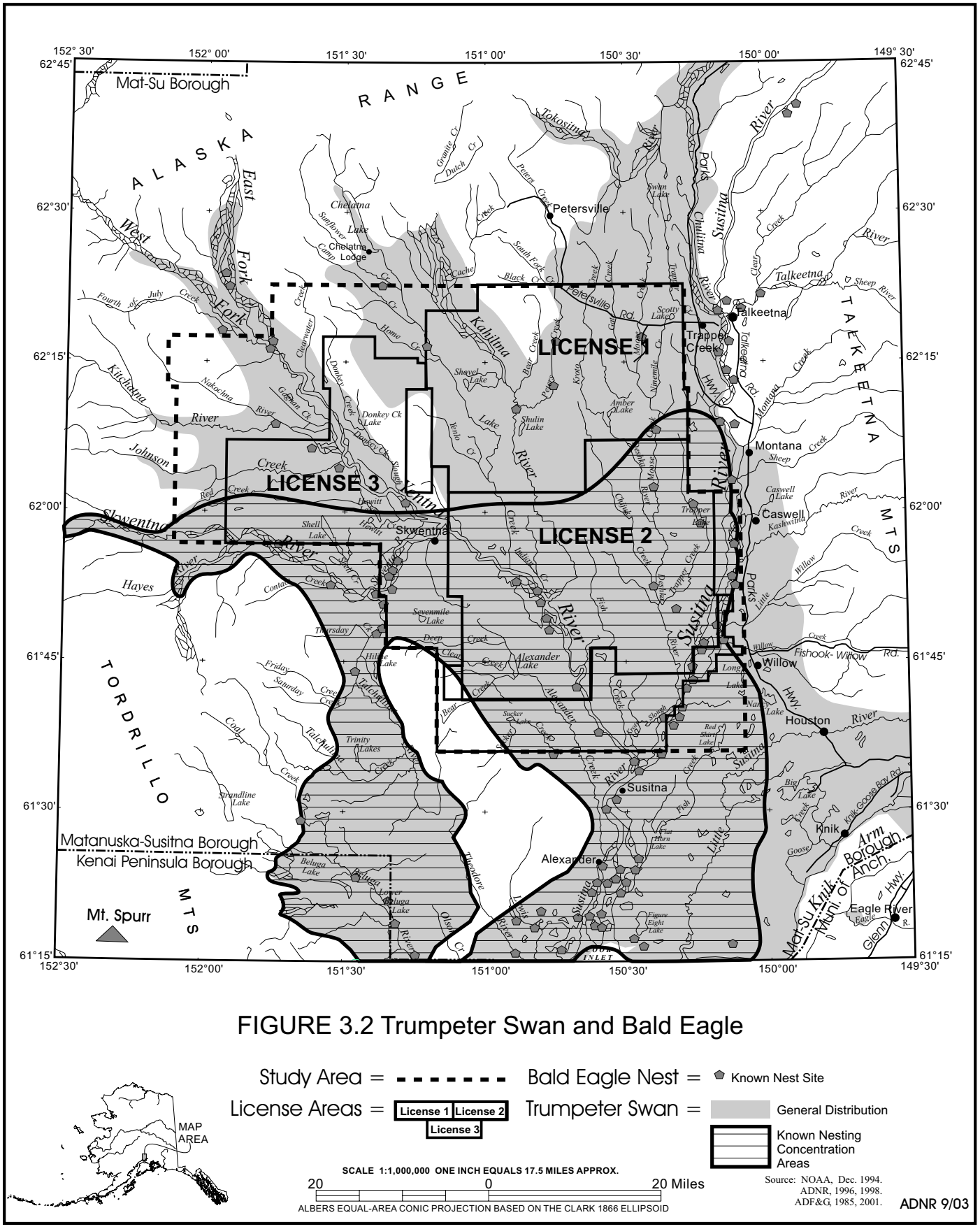

FIGURE 3.2 Trumpeter Swan and Bald Eagle

Table 3.2. Common Birds Found In and Near the Study Area.

Common Name	*Scientific Name*	Common Name	Scientific Name
Snow goose	*Chen caerulescens*	Trumpeter swan	*C. buccinator*
Emperor goose	*C. canagica*	Eurasian wigeon	*A. penelope*
Canada goose	*B. canadensis*	Canvasback	*Aythya valisineria*
Green-winged teal	*Anas crecca*	Redhead	*A. americana*
Mallard	*A. platyrhynchos*	Ring-necked duck	*A. collaris*
Northern pintail	*A. acuta*	Greater scaup	*A. marila*
Blue-winged teal	*A. discors*	Lesser scaup	*A. affinis*
Harlequin duck	*Histrionicus histrionicus*	Sandhill crane	*Grus canadensis*
Oldsquaw	*Clangula hyemalis*	Black-bellied plover	*Pluvialis squatarola*
Black scoter	*Melanitta nigra*	Lesser golden-plover	*P. dominica*
Surf scoter	*M. perspicillata*	Semipalmated plover	*Charadrius semipalmatus*
White-winged scoter	*M. fusca*	Killdeer	*C. vociferus*
Common goldeneye	*Bucephala clangula*	Black oystercatcher	*Haematopus bachmani*
Barrow's goldeneye	*B. islandica*	Greater yellowlegs	*Tringa melanoleuca*
Bufflehead	*B. albeola*	Lesser yellowlegs	*T. flavipes*
Common merganser	*Mergus merganser*	Short-billed dowitcher	*Limnodromus griseus*
Red-breasted merganser	*M. serrator*	Long-billed dowitcher	*L. scolopaceus*
Solitary sandpiper	*T. solitaria*	Common snipe	*Gallinago gallinago*
Wandering Tattler	*Heteroscelus incanus*	Red-necked phalarope	*Phalaropus lobatus*
Spotted sandpiper	*Actitis macularia*	Red phalarope	*P. fulicaria*
Whimbrel	*Numenius phaeopus*	Pomarine jaeger	*Stercorarius pomarinus*
Bristle-thighed curlew	*N. tahitiensis*	Parasitic jaeger	*S. parasiticus*
Hudsonian godwit	*Limosa haemastica*	Long-tailed jaeger	*S. longicaudus*
Bar-tailed godwit	*L. lapponica*	Bonaparte's gull	*Larus philadelphia*
Ruddy turnstone	*Arenaria interpres*	Mew gull	*L. canus*
Black turnstone	*A. melanocephala*	Ring-billed gull	*L. delawarensis*
Surfbird	*Aphriza virgata*	Herring gull	*L. argentatus*
Red knot	*Calidris canutus*	Glaucous-winged gull	*L. glaucenscens*
Sanderling	*C. alba*	Glaucous gull	*L. hyperboreus*
Semipalmated sandpiper	*C. pusilla*	Black-legged kittiwake	*Rissa tridactyla*
Western sandpiper	*C. mauri*	Sabine's gull	*Xema sabini*
Least sandpiper	*C. minutilla*	Arctic tern	*Sterna paradisaea*
Baird's sandpiper	*C. bairdii*	Aleutian tern	*S. aleutica*

winter surveys conducted in 1989-90 in California indicate that the population is about 6,900 birds (Trasky, 1995:10, citing to ADF&G, 1994b; D. Timm, 1986, Pers. Comm.; T. Rothe, 1994, Pers. Comm.).

Trumpeter swans *(Cygnus buccinator)* prefer secluded regions, where they frequent shallow bodies of water and build their nests in extensive areas of marsh vegetation. Most breeding pairs are at their nest sites by early May and the first hatching dates range from June 16 to June 29. In Alaska, young swans are unable to fly until 13 to 15 weeks of age. Most swans depart by mid-October but in some years may remain until freeze-up in November (ADF&G, 1985b:160). They winter on ice-free freshwater outlets. However, they may utilize saltwater, during extremely cold periods, when freshwater locations freeze (ADF&G, 1985b:158).

Bald eagles *(Haliaeetus leucocephalus)* are a common and visible raptor in the study area (See Figure 3.3). These birds are protected by the federal Bald Eagle Act of 1940, which makes possession of an eagle, either alive or dead, illegal (ADF&G, 1994). Eagle distribution is influenced by the availability of open water and anadromous streams containing adequate food resources. Eagles concentrate around spawning streams during fall and winter. Juveniles utilize spawned-out salmon as a major food source (Mickelson, 1989).

Eagles are most abundant from spring through fall during the nesting and brood rearing season. Eagles in Southcentral Alaska commonly nest in old cottonwood trees near water (ADF&G, 1994).

Bald eagle nesting sites are abundant in the study area. The criteria for bald eagle nesting sites include: areas usually within 200 yards of rivers, large lakes and streams which are known to support an adequate food supply, mature tall trees with limbs that can support a nest of possibly 1000 pounds, and sites away from human activity. Bald eagles may also nest on cliffs, sea stacks, or rock promontories near a water body (Rappoport, 2000).

Within the study area salmon provide the main diet for eagles. Eagles also feed on waterfowl, small mammals, and dead animals (ADF&G, 1994). Eagle populations are healthy throughout Alaska. Golden eagles *(Aquila chrysaetos),* also protected by the Bald Eagle Act, are found throughout the Susitna basin. These raptors feed primarily on ground squirrels, hares, and birds, such as ptarmigan, cranes, and owls. (ADF&G, 1994).

Chickadees *(Parus atricapillus)* are common throughout Alaska's forests with some species associated with conifers and others with deciduous forest cover. These small birds live an average of 2 to 3 years, and feed on insects, including several considered to be forest pests. Hawks and other flying predators eat chickadees.

Both the Sharp-shinned Hawk *(Accipiter striatus)* and the Northern Goshawk *(Accipiter gentilis)* are abundant in Alaska, but rarely seen. These birds are natural enemies and nest in woodland forests most frequently in middle age (20-45 years old) spruce trees. Eggs hatch in late May or early June. Goshawks eat snowshoe hares, grouse, ptarmigan, ducks, squirrels, voles, shrews, and some songbirds and shorebirds. Sharp-shins eat songbirds, small mammals and large insects. While hawks have few natural predators, sometimes bears, lynx, and other climbing predators can reach their nests (ADF&G, 1994).

The Boreal Owl *(Aegolius funereus)* ranges throughout the circumpolar forests including Alaska. The Saw-whet owl lives in southcentral coastal and southeast areas of the state. Owls nest in closed-canopy forests with at least some deciduous trees. Owls feed at night on voles, mice, shrews, and small birds. Marten are the main predator of the Boreal owl, and population cycles of voles are a limiting factor in owl populations. The Northern Hawk Owl *(Surnia ulula)* is a resident species found throughout Alaska. The owl hunts mostly during the day, is noted for its unusual tolerance of human activity, and will nest close to human settlements. In the Denali area, these owls feed primarily on red-backed voles and mice. Main predators are the Great Horned Owl and Northern Goshawk (ADF&G, 1994).

The Common Raven *(Corvus corax)* is a member of the Corvidae family, which also includes jays, crows, and magpies. The raven is the largest all-black bird in the world. Ravens feed on a variety of both plant and animal foods, and are accomplished scavengers. Ravens breed at age 3 or 4 years, mate for life, and can live up to 30 years. Ravens congregate near human settlements during non-breeding times (ADF&G, 1994).

Spruce grouse *(Canachites canadensis*) or spruce hens are common throughout Alaska. Preferred habitat includes spruce-birch forest with a thick understory of cranberry, blueberry, crowberry, and spirea, above a moss-covered ground. During summer, spruce grouse eat flowers, green leaves, and berries. Insects provide food for newly hatched chicks. Ruffed grouse *(Bonnasa umbellus)* are common to woodlands along interior Alaska rivers. They were recently introduced to the Matanuska-Susitna Valley, where they are flourishing. Summer foods include blueberries, high-bush cranberries, rose hips, and aspen buds. In winter, they feed primarily on the buds and twigs of aspen, willow, and soapberry. Game bird populations in Alaska fluctuate in a 10-year cycle. Coastal populations in Alaska remain more stable than interior ones (ADF&G, 1994).

Willow ptarmigan *(Lagopus lagopus),* Alaska's state bird, are found everywhere throughout Alaska's high, treeless country. Rock and White-tailed ptarmigan also inhabit all major treeless area of southern Alaska. Willow ptarmigan tend to live closest to the tree line. Hens nest on the open ground after snowmelt and hatchlings arrive in late June or early July. Ptarmigan populations fluctuate dramatically and the causes remain a mystery (ADF&G, 1994).

Common loons *(Gavia immer)* spend the summer on lakes throughout the interior, southcentral, and southeast portions of the state, and winter along the coast from the Aleutians to Baja California. The Pacific loon (Gavia pacifica) is the most common wintering loon on the coasts of Southcentral Alaska. Red-throated loons are also common throughout the state. Loons migrate to coastal areas in September or early October, and return to their freshwater nesting habitat in May. Loons mate for life and return each year to the same area to breed. Breeding success may be related to the presence of gulls, jaegers, and foxes. Loons are also susceptible to disturbance by floatplanes and fishers who force them to abandon their nest allowing the chicks to chill and die. Loons are excellent divers and feed on small fish, aquatic vegetation, insects, mollusks, and frogs (ADF&G, 1994).

3. Mammals

Numerous species of terrestrial mammals inhabit the Susitna basin. Big game species include moose, (Figure 3.3) black bear, and brown bear. Other terrestrial mammals include furbearers and small game.

Moose *(Alces alces)* range throughout the Susitna basin. Moose generally calve between late May and early June. They are year-round residents, although many exhibit seasonal movements related to snow depth and the availability of food. They are found in both lowland and upland shrub communities and lowland areas with ponds during summer and fall. In winter, moose concentrate in areas of relatively shallow snow depth, frequently along river drainages. Moose winter and calve along the Skwentna, Yentna, Kahiltna, Susitna, and Little Susitna Rivers (ADF&G, 1985b) (See Figure 3.4).

Moose depend on and prefer willow, birch, aspen, and cottonwood, in order of preference. Alder and willow are more important nutritionally in summer than birch leaves, while in winter, species of aspen and low-bush cranberry are more nutritionally important than birch twigs (Boggs, et al., 1997:180). Moose have high reproductive potential and can reach the carrying capacity of their range if not limited by predation, hunting and severe weather (ADF&G, 1994).

Black bear *(Ursus americanus)* and brown bear *(Ursus arctos)* occur within the study area. Specific information on critical habitats is limited, although basic behavior patterns have been documented. Black bear distribution coincides closely with that of forested areas. Semi-open forests with an understory of grasses, herbs, and fruit-bearing shrubs, are especially attractive to black bears. Brown bears utilize all habitat types, but grass communities appear to be most important, particularly in spring. Brown bears frequent meadows, muskegs, sedge flats, and grassy areas interspersed within forests. Known intensive use areas for black bear include the Susitna River at its mouth and an area along the river west of Willow. Brown bears also inhabit the area. Salmon heads and abundant streamside blueberries are favorite foods for bears.

Black bears generally emerge from their dens between the first of April and mid-May. Boars emerge about a week prior to sows and cubs. Brown bears emerge from their dens beginning in late April, although females with newborn cubs may not emerge until late May. After emerging from their dens, both species move to lower elevations where they feed on early-growing green vegetation. From May to mid-July, horsetail is a particularly important food item for black bears. Black and brown bears generally remain at lower elevations throughout the summer, congregating along anadromous streams to feed on spawning salmon. In late summer and fall, black and brown bears shift to alpine and subalpine areas, where they feed on ripened berries.

Black bears generally den in forested areas, excavating their dens at the base of spruce trees. Brown bears seem to prefer eskers as denning sites. Eskers are ridges or knolls of gravelly or sandy drift originally formed by streams within or under glacial ice. They are well-drained and free of permafrost, allowing construction of winter dens. Aspen trees typically grow in these areas and facilitate the identification of eskers, particularly during fall when the leaves turn a brilliant gold color. Denning activities usually commence around the first of October, and most bears will have entered their dens by mid-November (Miller, 1997). No denning concentration areas have been identified within the study area.

Black and brown bears mate anytime between May through July, with most of the activity occurring in June. Apart from mating, bears are solitary animals except for sows with cubs. Cubs are born in the den during mid-winter following a seven-month gestation period. One to four cubs are usually born, with two being most common. Both black and brown bear cubs usually remain with the mother for two years before separating, after which the female will breed again and produce a new litter (ADF&G, 1985b).

Wolves *(Canus lupus)* are present throughout the Susitna basin. Wolves den in dug-out holes in well-drained soils as deep as 10 feet. Wolves usually live in packs with parents and pups of the year. Larger packs may have two or three litters of pups from more than one female. Pack size normally ranges from 2 to 12 wolves (with an average of 6 or 7), however packs as large as 20 to 30 wolves may occur. Wolf packs tend to be territorial and stay within a particular range. Pack territory size ranges from 300 to 1,000 square miles with an average of 600 square miles of habitat. Breeding occurs in February and March, and litters are born in May or early June. In the study area, moose are the wolf's primary food source. The wolf's summer diet is supplemented by voles, lemmings, ground squirrels, snowshoe hares, beaver, and occasionally birds and fish (ADF&G, 1994).

Distribution of wolves has remained relatively constant in recent decades. While birth rates are high, mortality is also high. Abundance varies with prey availability, disease, malnutrition, accidents, harvest pressure, and intra-specific strife (ADF&G, 1994). In a study of wolves on the Kenai Peninsula in the 1980s, (Peterson et al., 1984) estimated that the rate of wolf predation on moose in winter averaged one moose per pack every 4.7 days. About half of all moose killed were calves, although calves made up only 20 percent of the moose population (Boggs, et al., 1997

Wolves are highly social animals and usually live in packs that include parents and pups of the year. Larger packs may have two or three litters of pups from more than one female. Some yearlings may stay with the pack. A dominance hierarchy characterizes the social order in the pack with a separate rank order among females and males. Fighting is uncommon within packs except during periods of stress, with the dominance order being maintained largely through ritualized behavior. Although pack size usually ranges from 2 to 12 animals, packs of as many as 20 to 30 wolves sometimes occur. The average size pack is 6 or 7 animals. In most areas wolf packs tend to remain within a territory used almost exclusively by pack members, with only occasional overlap in the ranges of neighboring packs. In Alaska the territory of a pack often includes from 300 to 1,000 square miles of habitat with the average being about 600 sq. mi. (ADF&G, 1994).

Other terrestrial mammals also inhabit the Susitna region. Small furbearers include coyote, beaver, lynx, marmot, marten, mink, muskrat, squirrel, red fox, river otter, weasels, and wolverine. The Susitna basin has one of the highest coyote population densities in the state. Small game include bats, hares, lemmings, pikas, porcupine, shrews, voles, and mice (ADF&G, 1994). Furbearers are present in nearly all types of habitat, although most species occur in riparian, wetland, or forested areas.

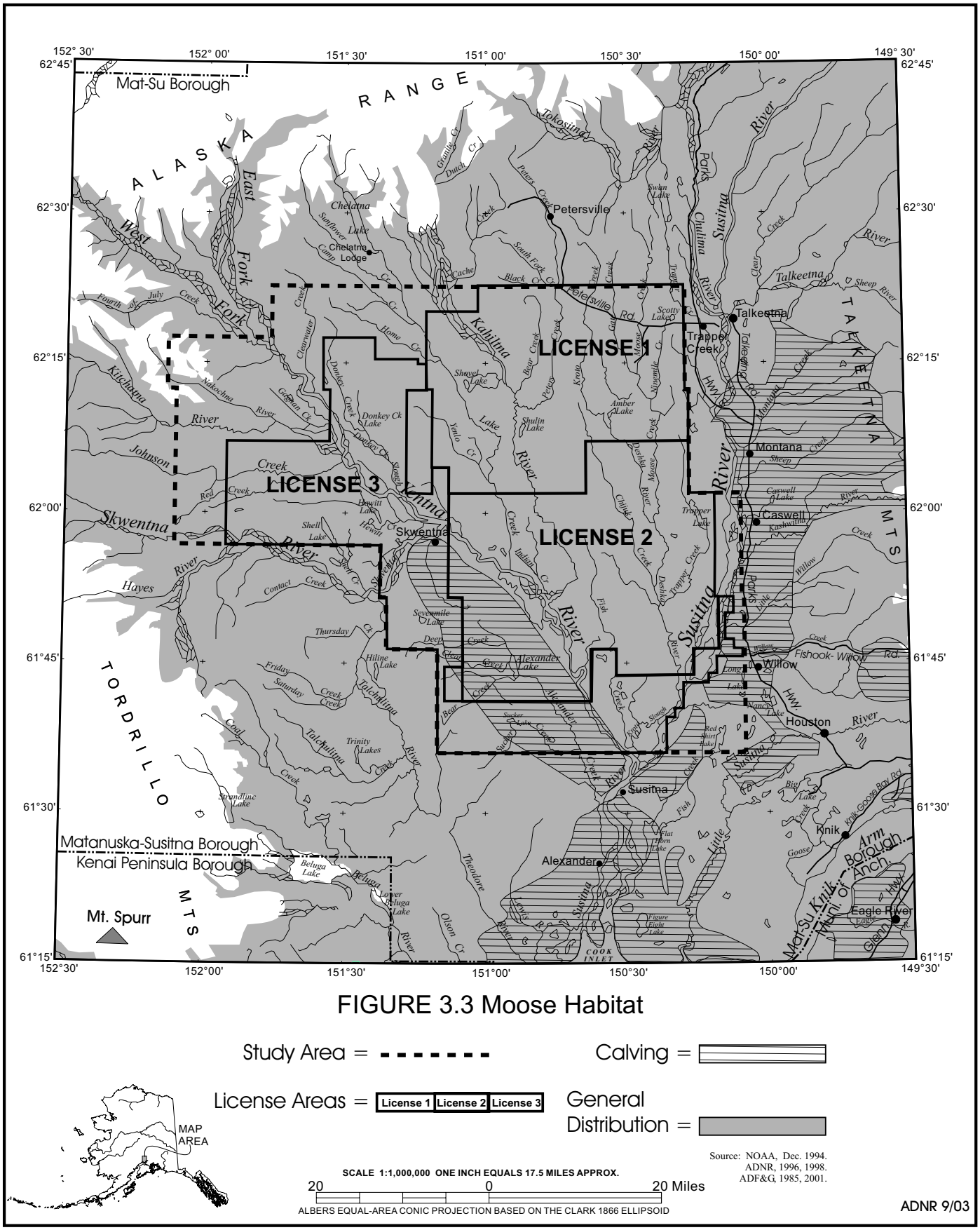

FIGURE 3.3 Moose Habitat

Study Area = - - - - - -

Calving =

License Areas = License 1 | License 2 | License 3

General Distribution =

MAP AREA

SCALE 1:1,000,000 ONE INCH EQUALS 17.5 MILES APPROX.

20 0 20 Miles

ALBERS EQUAL-AREA CONIC PROJECTION BASED ON THE CLARK 1866 ELLIPSOID

Source: NOAA, Dec. 1994.
ADNR, 1996, 1998.
ADF&G, 1985, 2001.

ADNR 9/03